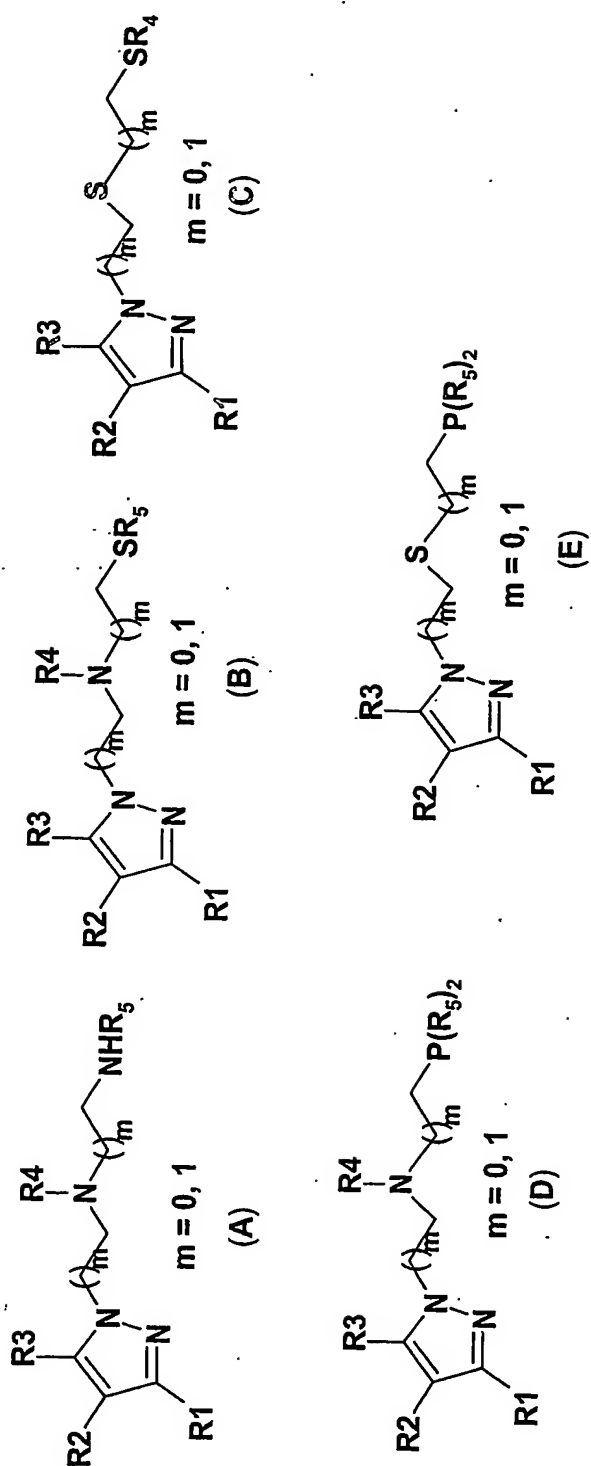


$X = NR_4$, $Y = NHR_5$, SR_5 , $P(R_5)_2$; $X = S$, $Y = NHR_5$; $X = SR_5$; $P(R_5)_2$

BM = Biomolecule

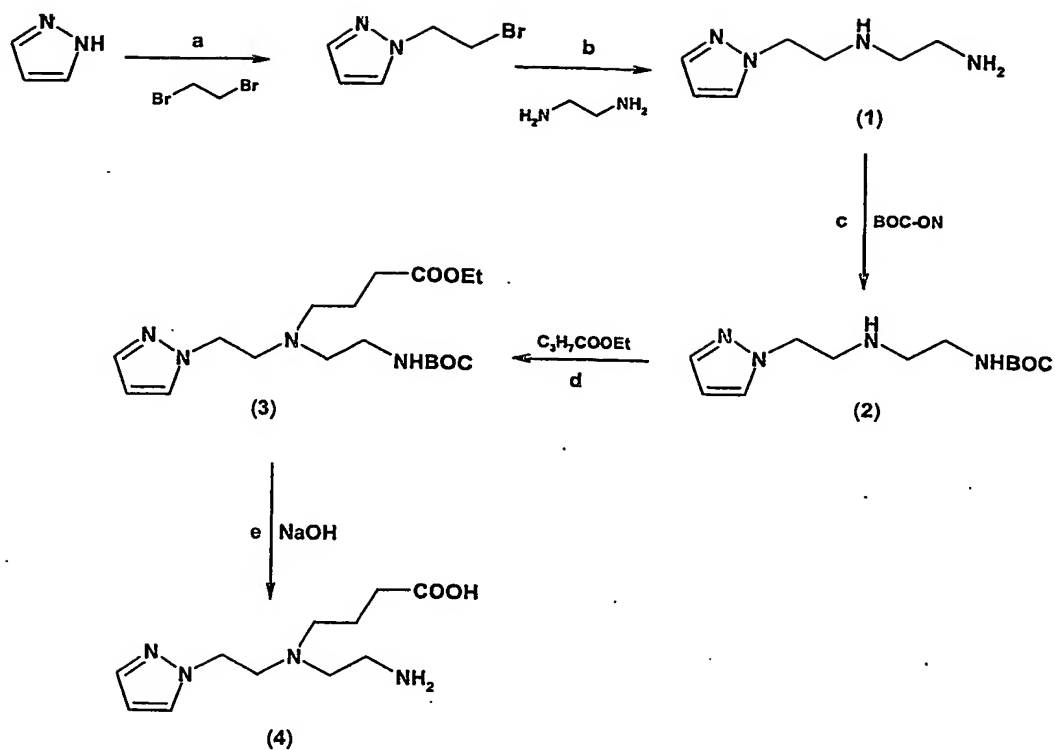
R_1 - R_5 are as defined Table 1

Fig. 1

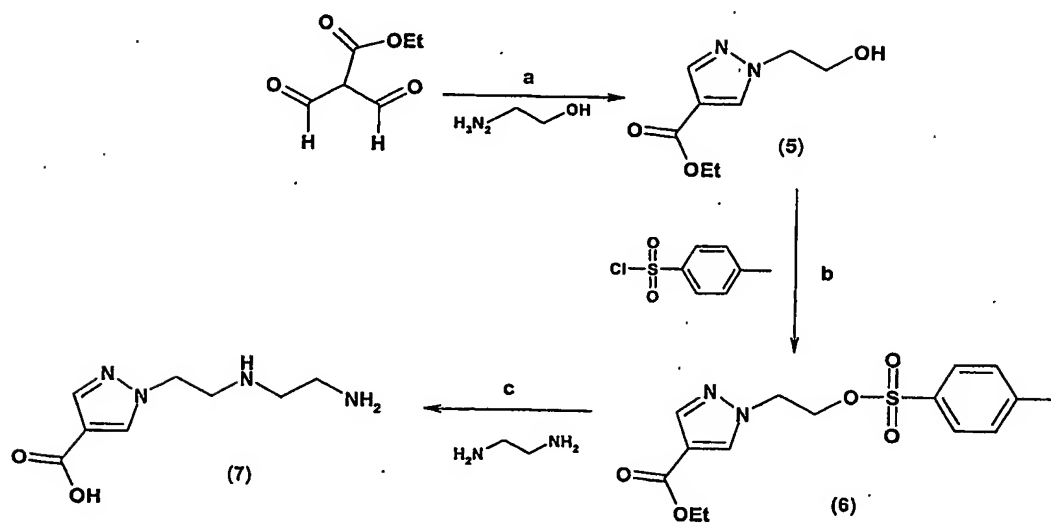


1. Pyrazolyl-polyamines
2. Pyrazolyl-aminothioethers
3. Pyrazolyl-polythioethers
4. Pyrazolyl-aminophosphines
5. Pyrazolyl-thioetherphosphines

Fig. 2

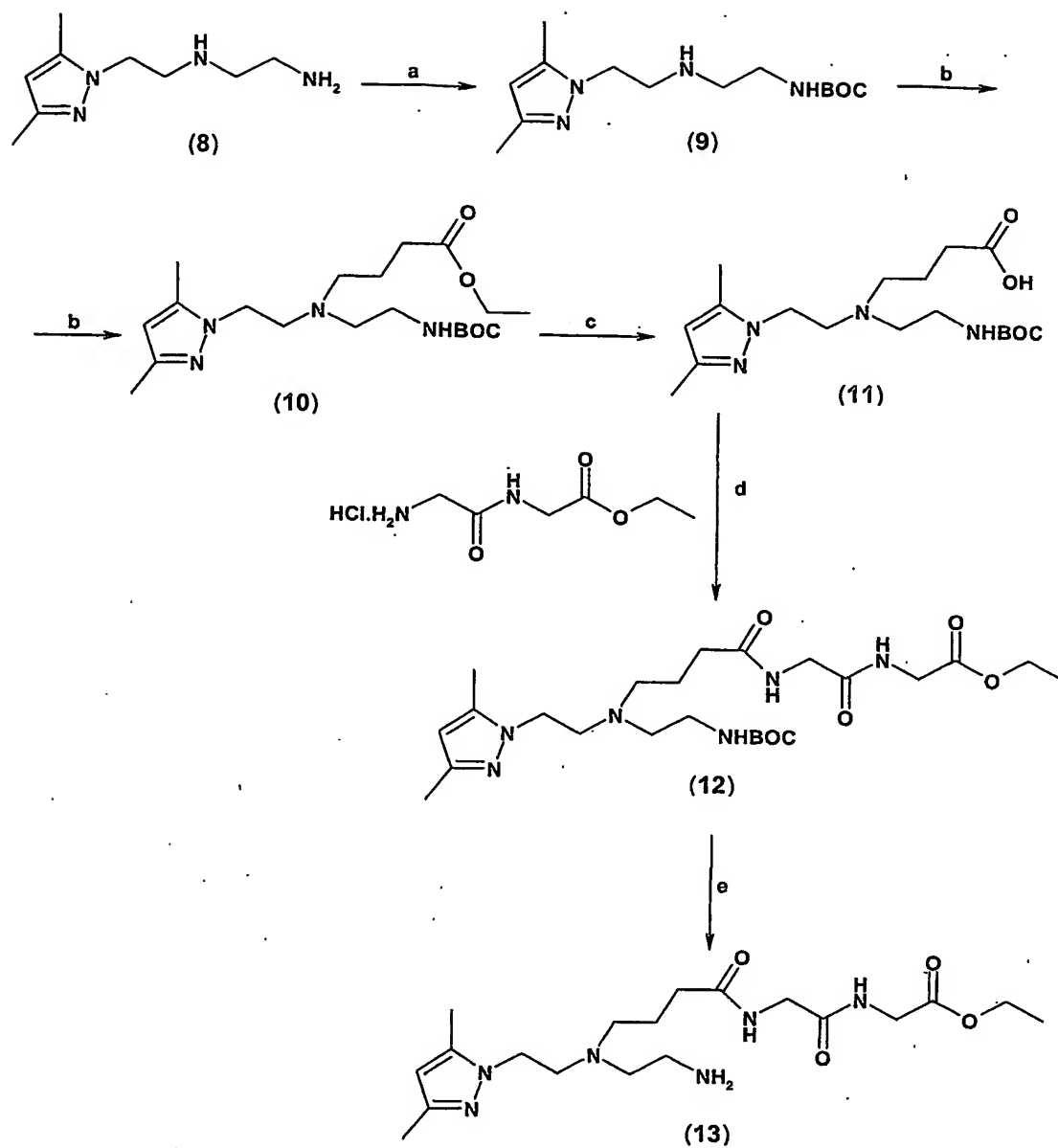


a. NaOH 40% / TBAB; b. THF / H_2O / reflux / 4h; c. DMF, 0 °C, 3 h; d. CH_3CN / reflux / 3d; e. H_2O / .t. / 1d



a. Ethanol, 0°C, overnight; b. NaOH, Acetone, H_2O , T.A., 3d; c. NaOH, THF, H_2O , reflux, 24h

Fig. 3



a. BOC-ON, THF, 0°C, 2h

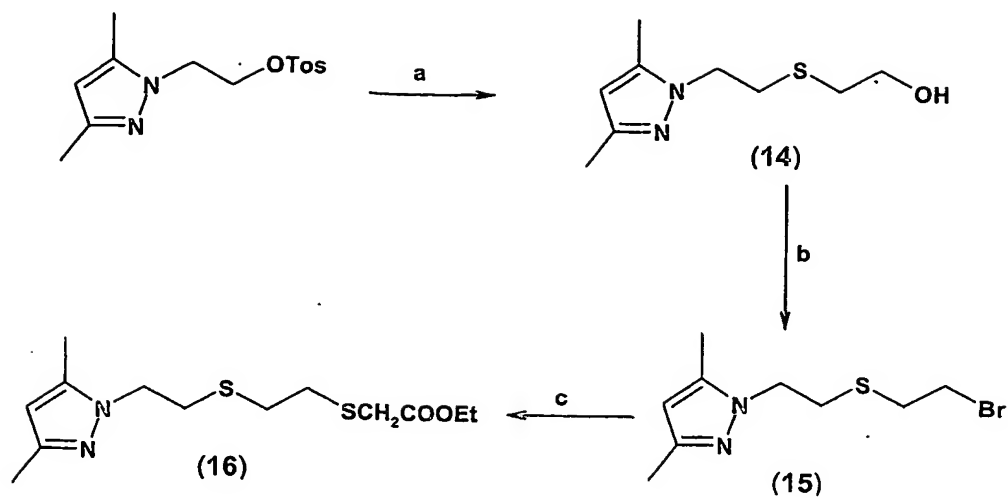
b. Ethyl 1-Bromobutyrate, K_2CO_3 , KI, CH_3CN , r.t, 11d

c. NaOH, H_2O , THF, reflux, overnight

d. HBTU, NEt_3 , CH_3CN , rt, 4h

e. TFA, CH_2Cl_2 , r.t, 1h

Fig. 4



a. mercaptoethanol, NaOH, THF/H₂O, reflux, 3h

b. PBr₃, CHCl₃, reflux, overnight

c. NaOH, H₂O, THF, reflux, overnight

d. Ethyl 2-mercaptoacetate, NaOEt, EtOH, r. t., overnight.

Fig. 5

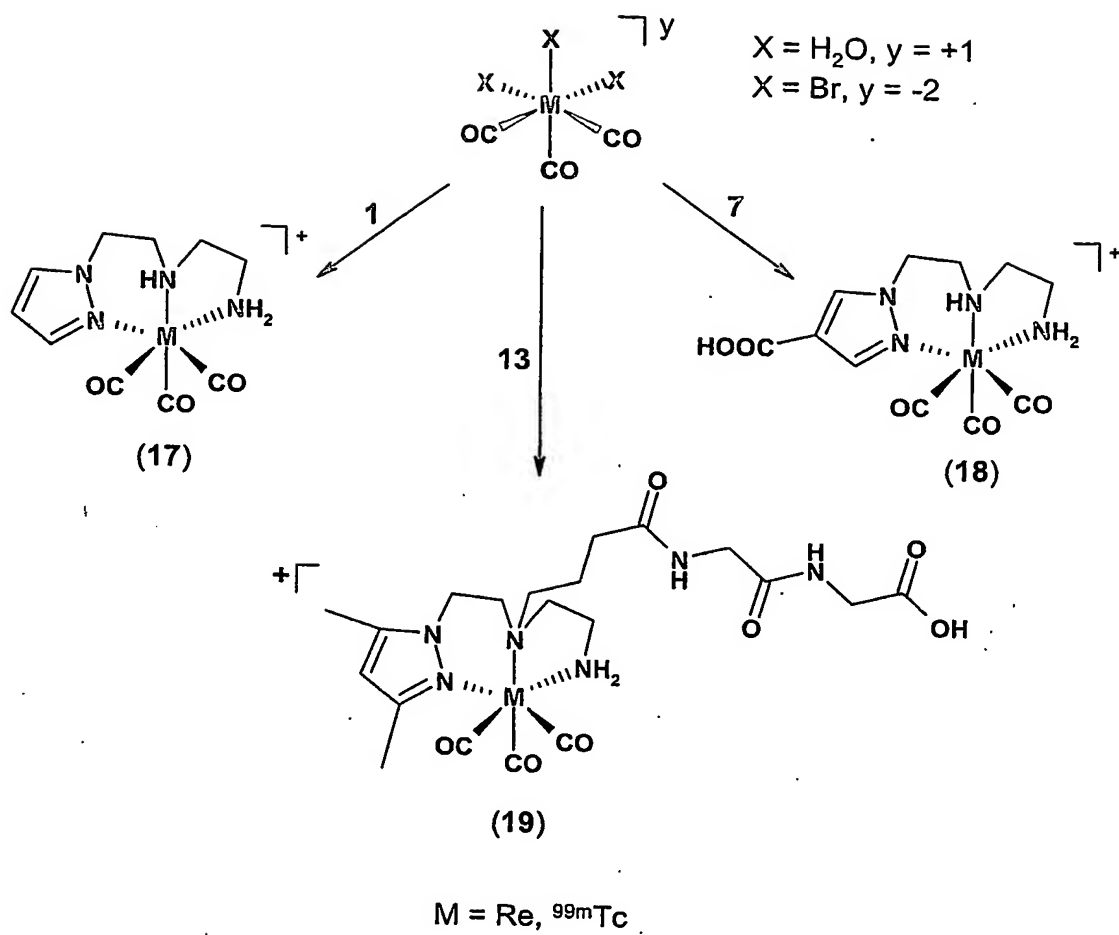


Fig. 6

Fig. 7

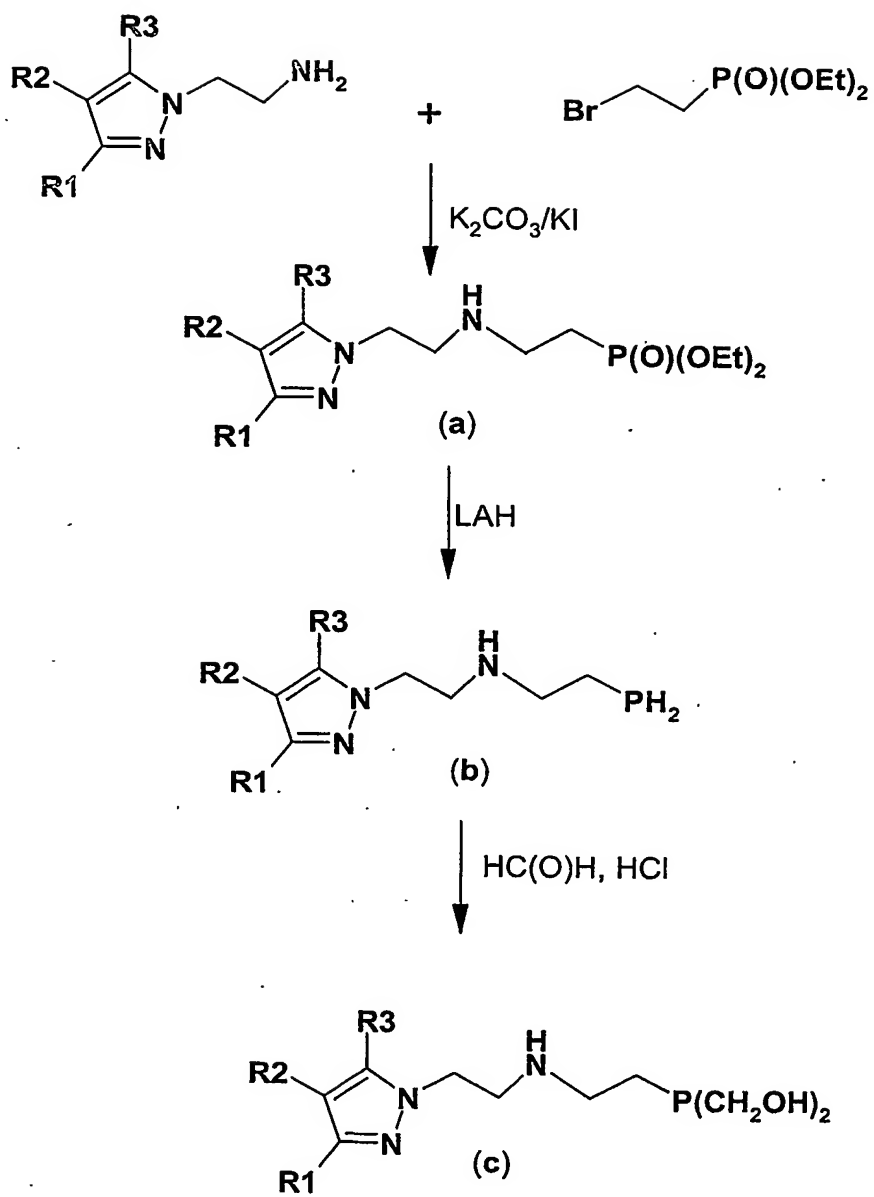


Fig. 8

